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Indian Standard

SPECIFICATION FOR CELLULOSIC PAPERS FOR ELECTRICAL PURPOSES

PART I DEFINITIONS AND GENERAL REQUIREMENTS

UDC 621·315·614·6 : 676·254 : 001·4

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Alteration

(Page 6, Table 1, col 7, against Type 1.2) - Substitute '0.5' *for* '5.0'.

(ETDC 63)

Reprography Unit, BIS, New Delhi, India

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SPECIFICATION FOR CELLULOSIC PAPERS FOR ELECTRICAL PURPOSES

PART I DEFINITIONS AND GENERAL REQUIREMENTS

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Indian Standard

SPECIFICATION FOR CELLULOSIC PAPERS FOR ELECTRICAL PURPOSES

PART I DEFINITIONS AND GENERAL REQUIREMENTS

0. FOREWORD

0.1 This Indian Standard (Part I) was adopted by the Indian Standards Institution on 9 November 1979, after the draft finalized by the Electrical Insulation Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard (Part I) is one of the series of Indian Standards which deals with cellulosic papers for electrical purposes. This series will have the following three parts:

Part I Definitions and general requirements,

Part II Methods of test, and

Part III Specifications for individual materials.

0.2.1 This standard (Part I) covers the definitions and general requirements for cellulosic papers for electrical purposes.

0.3 This standard lays down a system of type numbers for the identification of papers and gives a list of thicknesses for general purpose electrical papers, capacitor tissue and electrolytic capacitor paper.

0.4 In the preparation of this standard, assistance has been derived from IEC Publication 554-1 (1977) Specification for cellulosic papers for electrical purposes: Part I Definitions and general requirements, issued by the International Electrotechnical Commission (IEC).

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard (Part I) covers the definitions related to and the general requirements to be fulfilled by cellulosic papers for electrical purposes.

1.2 Papers containing modified cellulose are not covered by this standard.

2. DEFINITIONS

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Kraft Insulating Paper — Paper made entirely from soft-wood pulp manufactured by the sulphate process.

2.2 Greaseproof Paper — Paper free from mechanical pulp having a high resistance to penetration by grease. This resistance is obtained by heavy beating which gives the appearance of vegetable parchment.

2.3 Japanese Tissue Paper — A lightweight paper characterized by long fibres and a high ratio of tensile strength in the machine direction to tensile strength in the cross-direction.

2.4 Manila Paper — Paper made entirely from Manila hemp fibres.

2.5 Manila/Kraft Mixture Paper — Paper made from Manila hemp fibre with the addition of kraft soft-wood pulp manufactured by the sulphate process.

NOTE — If the furnish is required to contain a definite proportion of Manila hemp fibre, this proportion should be specifically stated in the enquiry and/or order.

2.6 Kraft Capacitor Tissue — A lightweight paper made entirely from soft-wood pulp manufactured by the sulphate process. The pulp is subjected to thorough washing to remove, as far as practicable, the chemicals used in manufacture.

2.7 Electrolytic Capacitor Paper — Paper for separating electrodes in electrolytic capacitors and for containing the electrolyte.

2.8 Air Permeability — The amount of air passing through the paper per unit time reduced to unit surface area and unit pressure difference between opposite faces of the paper under specified test conditions.

2.9 Apparent Density — The mass per unit area, in grams per square metre, divided by the thickness, in micrometres, and expressed as grams per cubic centimetre.

2.10 Breaking Length — The calculated limiting length of a strip of paper of any uniform width, beyond which, if the strip was suspended by one end, it would break under its own weight.

2.11 Bursting Strength — The maximum pressure paper can sustain under conditions specified in the test method.

2.12 Central Values — The middle value of an odd number of test results or the mean of the two middle values of an even number of test results when these results are arranged in ascending order of magnitude.

2.13 Creping — A process of imparting an irregular close crimp to the paper to increase its thickness and its extensibility in the machine direction.

2.14 Crepe Paper — Paper that has been subjected to creping.

2.15 Glazed Paper — A paper having a lustrous surface finish imparted by an appropriate drying or mechanical finishing process.

2.16 Substance (Grammage) — The mass per unit area expressed in grams per square metre. The term "grammage" has been accepted in ISO to replace the term "substance"; however, because of electrical engineering practice of using the word "substance", it will be used here.

3. DESIGNATION

3.1 Papers shall be identified by a type number consisting of a class number followed by a hyphen and the number of the paper on the corresponding specification sheet. The papers are identified as shown in Table 1.

3.1.1 Complete designation is formed by combining the symbols in columns 2, 4 and 6 of Table 1 according to the following example.

NOTE 1 — Conductivity of aqueous extract and air permeability symbols are applicable only for types 1·1 to 1·4.

NOTE 2 — The parameters defined in Table 1 are basic properties required for paper-making purposes. Electrical properties relative to these parameters are further defined in Part III (Specification for Individual Materials) of this standard.

Example: 1·2-2M = apparent density greater than 0·75 and not exceeding 0·85 g/cm^3, conductivity over 4 mS/m and air permeability "medium" between 0·05 and 0·5 μm/Pa.s.

4. GENERAL REQUIREMENTS

4.1 All material in any one consignment shall be as consistent as possible and have properties within the limits of this standard throughout the consignment.

TABLE 1 DESIGNATION

(*Clauses* 3.1 *and* 3.1.1)

CLASS	TYPE		FURTHER DESCRIPTION OF KRAFT INSULATING PAPER			
	Symbol	Description	Conductivity of Aqueous Extract (mS/m)		Air Permeability (µm/Pa. s)	
			Symbol	Description	Symbol	Description
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. General purpose electrical paper	1.1	Kraft insulating paper apparent density $\leqslant$ 0·75 g/cm^3	—1	< 4	L	$\leqslant$ 0·05
	1.2	Kraft insulating paper apparent density > 0·75...$\leqslant$ 0·85g/cm^3			M	> 0·05 .. $\leqslant$ 5·0
	1.3	Kraft insulating paper apparent density > 0·85 . $\leqslant$ 0·95 g/cm^3				
	1.4	Kraft insulating paper apparent density > 0·95 g/cm^3	—2	> 4	H	> 0·5
	1.5	Greaseproof paper				
	1.6	Japanese tissue paper				
	1.7	Manila paper				
	1.8	Manila/kraft mixture paper				
2. Capacitor tissue	2.1	Kraft capacitor tissue paper				
3. Crepe paper	3.1	Hard, comparatively non-absorbent creped kraft insulating paper				
	3.2	Soft porous creped kraft insulating paper				
4. Electrolytic capacitor paper	4.1	Absorbent separator paper, long fibres				
	4.2	Absorbent separator paper, short fibres				
	4.3	Non-aborbent paper				

5. THICKNESS

5.1 Unless specially agreed between purchaser and supplier, the nominal thickness in micrometres shall be one of the following:

a) General purpose electrical papers: 15, 20, 25, 50, 65, 75, 100, 125, 160, 200 or 250;

b) Capacitor tissue: 5, 6, 7, 7·5, 8, 9, 10, 12, 15, 18, 20, 25 and 30; and

c) Electrolytic capacitor paper:

   1) Types 4.1 and 4.2: 30, 45, 60, 75 or 90; and

   2) Type 4.3: 10, 12 or 15.

5.2 When determined in accordance with **3** of Part II of this standard the measured thickness shall be within ± 10 percent of the nominal value, unless otherwise stipulated in Part III of this standard.

6. PACKAGING

6.1 The paper shall be placed in a packing which ensures adequate protection during transport, handling and storage.

7. MARKING

7.1 Each package shall have the following information clearly and indelibly marked on it:

a) Designation,
b) Type,
c) Batch reference number,
d) Thickness of paper,
e) Outer diameter and width of roll,
f) Mass of roll,
g) Date of manufacture, and
h) Country of manfacture.

7.1.1 Each package may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

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INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 $kg.m/s^2$
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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